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09/890,871	08/07/2001	Tatsuya Nishimura	2001-1110-A	9174

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WENDEROTH, LIND & PONACK, L.L.P.
2033 K STREET N. W.
SUITE 800
WASHINGTON, DC 20006-1021

EXAMINER
WILKINS III, HARRY D

ART UNIT	PAPER NUMBER
1742	

DATE MAILED: 08/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/890,871	Applicant(s) NISHIMURA ET AL
	Examin r Harry D Wilkins, III	Art Unit 1742

-- The MAILING DATE of this communication appears on the cov r sheet with th correspondence address --

Peri d for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 and 14 July 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *35-56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *35-56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. The claim objections and rejection under 35 USC 112, 2nd paragraph have been withdrawn in view of Applicant's amendment.

2. The rejection under 35 USC 102 based on So et al has been withdrawn in view of Applicant's amendment.

Drawings

3. Applicant submitted "Formal Drawings" on 10 July 2003. However, as described in Applicant's remarks, these drawings contain substantive changes to the actual figures. Therefore, these drawings are not formal drawings, and are in fact, proposed amendments. However, the requirements for making drawing changes include submitting "marked-up" copies of the drawings indicating the changes to be made. Applicant should resubmit the proposed drawing amendments including marked-up copies of the original drawings indicating the amendments. Upon approval of the proposed amendments, the "formal drawings" will be entered as amended sheets, assuming that the proposed amendments are the same as the "formal drawings".

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 35 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al (JP 09-215982) in view of Fortson (US 4,049,402) and Gilchrist (US 3,798,150).

So et al teach (see abstract and figure) an electrolytic device for electrolyzing water with reducing substances (sewage) at high temperature and pressure, the device containing a reaction cell defining a chamber with a pair of electrodes (1 and 2).

Fortson teaches (see abstract and col. 1, lines 11-14) that hydrogen and oxygen can be dissolved in water by application of sufficient pressure thus creating a non-explosive mixture. The increased solubility of gases in a liquid with increased pressure is the subject matter of Henry's law, one of the basic laws of gases in chemistry.

Therefore, it would have been obvious to one of ordinary skill in the art to have increased the pressure of the treatment of So et al such that any hydrogen and oxygen produced by the electrolysis reaction were dissolved into the water thus avoiding any explosion hazards.

So et al do not teach that the device had two or more tubular reaction cells having a metal inner well serving as a cathode and an anode is provided in each of the reaction cells.

Gilchrist teaches (see Figs. 6-9 and col. 6, line 33 to col. 7, line 51) a reaction cell system that includes multiple tubular electrolytic cells (72 and 92) that have anodes disposed therein.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the method of So et al to the device of Gilchrist in order to make the treatment

method of So et al continuous and to increase the amount of contact area of the waste water with the electrodes as provided for by the tubular electrode set up of Gilchrist (see Gilchrist at col. 2, lines 11-13).

Regarding claim 47, So et al teach (see Example on pages 6-8 of translation) that the method of operating the device was to input water with reducing substances (calcium chloride and sodium bicarbonate) into the device, apply a voltage into the reaction cell at a temperature greater than 100°C (see Table 1), and evacuate the reaction cell to check for scales (solid precipitates) on the cell wall (anode) and cathode. The pressure is inherently kept high enough to ensure the water stayed in liquid form because the electrolytic reaction would not proceed if the water evaporated into a gaseous phase and the pressure to keep the hydrogen gas dissolved in the water, as taught by Fortson, is greater than the pressure required to keep the water in liquid form.

6. Claims 41 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al (JP 09-215982) in view of Fortson (US 4,049,402) and Stralser (US 3,975,247).

So et al teach (see abstract and figure) an electrolytic device for electrolyzing water with reducing substances (sewage) at high temperature and pressure, the device containing a reaction cell defining a chamber with a pair of electrodes (1 and 2).

Fortson teaches (see abstract and col. 1, lines 11-14) that hydrogen and oxygen can be dissolved in water by application of sufficient pressure thus creating a non-explosive mixture. The increased solubility of gases in a liquid with increased pressure is the subject matter of Henry's law, one of the basic laws of gases in chemistry.

Therefore, it would have been obvious to one of ordinary skill in the art to have increased the pressure of the treatment of So et al such that any hydrogen and oxygen produced by the electrolysis reaction were dissolved into the water thus avoiding any explosion hazards.

So et al do not teach that the device had two electrodes, each having two or more cylindrical walls as claimed.

Stralser teaches (see Figs. 4 and 5 and col. 6, line 53 to col. 7, line 9) such a device. The first electrode (comprising 26 and 28) had two concentric cylinder walls and the top of the cell connected the two walls to each other. The second electrode (comprising 27 and 29) had two concentric cylinder walls and the bottom of the cell connected the two walls to each other. The walls are arranged alternating with each other to form a channel for influent between the first electrode walls and the second electrode walls.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the method of So et al to the device of Stralser in order to make the treatment method of So et al continuous and to increase the amount of contact area of the waste water with the cathode and anode to provide higher current emission as provided for by the electrode set up of Stralser (see Stralser at col. 6, lines 53-57).

Regarding claim 52, So et al teach (see Example on pages 6-8 of translation) that the method of operating the device was to input water with reducing substances (calcium chloride and sodium bicarbonate) into the device, apply a voltage into the reaction cell at a temperature greater than 100°C (see Table 1), and evacuate the

reaction cell to check for scales (solid precipitates) on the cell wall (anode) and cathode. The pressure is inherently kept high enough to ensure the water stayed in liquid form because the electrolytic reaction would not proceed if the water evaporated into a gaseous phase and the pressure to keep the hydrogen gas dissolved in the water, as taught by Fortson, is greater than the pressure required to keep the water in liquid form.

7. Claims 36, 42, 48 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al (JP 09-215982) in view of Fortson (US 4,049,402) and either Gilchrist (US 3,798,150) or Stralser (US 3,975,247) as applied to claims 35, 41, 47 and 52 above, and further in view of Yuasa et al (JP 09-117782).

The teachings of So et al in view of Fortson and either Gilchrist or Stralser are described above in paragraphs no. 5 and 6. The apparatuses of Gilchrist and Stralser have influent lines and effluent lines for supplying and discharging the water from the reaction cell. It would have been within the expected skill of a routineer in the art to have provided the high pressure, as taught by Fortson, through use of a high pressure pump.

However, So et al in view of Fortson and either Gilchrist or Stralser do not teach that an oxidizer line is added for supplying an oxidizer to the reaction cell.

Yuasa et al teach (see English abstract) means for treating waste water under high pressure and temperature that includes adding an oxidizer, oxygen, to the reaction chamber for the purpose of facilitating the reaction for the eradication of the waste.

Therefore, it would have been obvious to one of ordinary skill to have added an oxidizer line to the apparatus of So et al in view of Fortson and either Gilchrist or

Stralser because the oxidizer facilitates the removal of the waste from the water.

8. Claims 37, 43, 49 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al (JP 09-215982) in view of Fortson (US 4,049,402) and either Gilchrist (US 3,798,150) or Stralser (US 3,975,247) as applied above to claims 35, 41, 47 and 52 and further in view of Pitora et al (SU 962212).

The teachings of So et al in view of Fortson and either Gilchrist or Stralser are described above in paragraphs no. 5 and 6.

So et al in view of Fortson and either Gilchrist or Stralser do not teach that conductive particles were added to the influent.

Pitora et al teach (see Derwent abstract) that waste containing organic compounds was treated in a layer of granulated electrically conductive material that was located between two electrodes in a field.

Therefore, it would have been obvious to one of ordinary skill in the art to have adapted the method of So et al to include the addition of conductive particles as taught by Pitora et al because Pitora et al teach (see Derwent abstract) that the conductive particles provide a higher degree of purification of the waste water and a lower power consumption.

9. Claims 38-40, 44-46, 50, 51, 55 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al (JP 09-215982) in view of Fortson (US 4,049,402), Pitora et al (SU 962212) and either Gilchrist (US 3,798,150) or Stralser (US 3,975,247) as applied to claims 37, 43, 49 and 54 above, and further in view of Hess et al (US 3,652,405).

As above, So et al in view of Fortson, Pitora et al and either Gilchrist or Stralser do not expressly teach a separator being used to remove the conductive particles from the effluent stream.

However, because the goal of the process/apparatus of So et al is the purification of water, it would have been obvious to one of ordinary skill in the art to have added means for separating out the conductive particles because they would not be desired in the final pure water product.

A routineer in the art would have looked to conventional means for separating out the conductive particles, such as those disclosed by Hess et al (see figure and col. 2, lines 42-45) that a slurry (solid particles suspended in a liquid) was separated by means such as a filter or cyclone.

Hess et al teach that the separating means were either a filter or a cyclone. Thus, it would have been obvious to use one of the conventional means disclosed by Hess et al in order to separate out the conductive particles in order to have created a more pure final water effluent.

Response to Arguments

10. Applicant's arguments filed 14 July 2003 have been fully considered but they are not persuasive. Applicant argued that contrary to what is expected, the increased surface area of the electrode does not result in an explosive condition during hydrothermal electrolysis.

In response to Applicant's argument, reference is made to Henry's law, a basic law of gaseous chemistry, which basically states that as the partial pressure of a gas

above a liquid goes up, the solubility of that gas in the liquid proportionally increases. Thus, one of ordinary skill in the art would have expected that with increased pressure, the solubility of hydrogen in water would have increased. In addition, according to Fortson, a means for removing the explosion hazard when mixing hydrogen with oxygen was by dissolving each of the gases in water. Thus, one of ordinary skill in the art would have realized that by dissolving the hydrogen and oxygen in the water, the explosive condition would have been removed, and, in view of Henry's law, one of ordinary skill in the art would have realized that increasing the pressure would have facilitated the dissolving of the gases.

In addition, in regards to Applicant's statement in the middle paragraph on page 13 of the response filed 14 July 2003, it appears that the generation of hydrogen gas and oxygen gas is highly suppressed because the generated H_2 and O_2 are immediately dissolved into the water while under the high pressure. Thus, the mechanism for suppressing the generation of the gas is to dissolve the molecules in the water. However, this practice was well known in the art to reduce the explosion hazard, as evidenced by Fortson.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D Wilkins, III whose telephone number is 703-305-9927. The examiner can normally be reached on M-Th 10:00am-8:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V King can be reached on 703-308-1146. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Harry D Wilkins, III
Examiner
Art Unit 1742

hdw
August 15, 2003

ROY KING
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700